

# Place of Science in a People's Movement

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Whatever I am going to say here is based on the collective experience and insight gained by the Kishore Bharati Group in the field of development and social change since 1972. Located in village Palia Piparia of Bankhedi Block in the eastern tip of Hoshangabad District of Madhya Pradesh, the Kishore Bharati Group has conducted a wide variety of experiments concerned with economic growth, social organisation, youth development, health and education, both formal and non-formal. Although the economic development and health programmes have been concentrated mainly within Bankhedi Block and surrounding villages, the educational and youth involvement work has allowed us to interact not just with the people of Hoshangabad District, but with various groups of people in other parts of Madhya Pradesh as well.

The focus of all these activities has been to explore the fundamental causes of the severe poverty, exploitation and disparity in our society, and to evolve ways of resolving these contradictions. The strategy has been to subject all of our experiences to exhaustive scientific analysis with the purpose of evolving general principles which could have wider social application. This exercise of building up theoretical understanding through field-level practice has been further enriched by relating whatever we have learnt with what Government agencies, other voluntary groups, and people's movements have been learning in different parts of the country. For this enrichment, we must thank those hundreds of activists and thinkers who have been more than willingly shared their experiences and analyses with us, and thus have made us a part of the nationwide struggle for social justice and development.

The experiences of others, including those of Government agencies, voluntary groups and people's movements, are used here as case studies for bringing out contradictions in our society and for evolving hypotheses for further experimentation. Nowhere are these case studies presented as personal criticism of people who are working in these organisations. I must convey my feelings of fellowship to all such people for they too, like us, must be engaged in their own battles against injustices, irrationality, stagnancy, and other mechanisms of backwardness within their own organisations.

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Let me begin with a meeting to which I was invited last year around this time to review the Science and Technology (S&T) component of education in the context of the Sixth Five-Year Plan. The purpose of the meeting was to make recommendations to the Planning Commission to make S&T education more relevant to the socio-economic needs of Indian society. The chairman of the meeting began by inviting the experts to make their recommendations. One after the other, the experts started reeling off their views on various schemes and ideas which need to be implemented. After three such statements, a couple of us intervened and enquired whether a critique of the S&T component of education in previous Five-Year Plans was available. Of course no such critique could be produced. We then suggested that the meeting should first attempt to find out the manner in which the previous

plans had failed to relate S&T education to the needs of society. Only then would we have a scientific basis for making fresh recommendations, we argued. What amazed us was total lack interest in the entire body of national experts who had gathered there to spend even a few minutes on this question.

Judging the mood of the meeting, the chairman had to resolve the dilemma by announcing, “We all know what was wrong with the previous Plans. We must now begin afresh and make new recommendations.” The meeting then went on merrily for the next four hours, each expert making a fresh recommendation, often totally unrelated to what was said by others, and fully oblivious of the fact that what was being recommended by him or her had already been implemented in one form or the other in the previous Plans. Whenever one of us tried to point this out, there were hurried attempts to hush up such uncomfortable questions so that ‘we make best use of the valuable time of the experts’.

At the end of the meeting I wondered whether these scientists and educationists would have picked up a research problem without surveying the previous literature. Obviously not. Why then was this scientific practice of analysing previous experience before the beginning a new piece of research work so blatantly ignored at this meeting on S&T education? Why didn’t this unscientific approach disturb the national experts assembled there for the very purpose of improving science education?

The story of this meeting is typical of all the meetings which I have had a chance to attend during the last several years—be it on adult education, or on rural development, or on bonded labour, or on collective management, or on appropriate technology, or on the role of voluntary agencies. In all of these meetings, there has been a commonality—a complete lack of interest in analysing the historical experiences not only of others, but also of their own, a general unpreparedness to learn from the past, and yet there has been an eagerness to make quick recommendations unmindful of the fact that these so-called new ideas have been part of the nation’s previous experience. One is struck by the absence of scientific methodology at such high echelons of Indian bureaucracy and technocracy. How does one explain this contradiction?

Let me take another example. In 1969, I attended a UNESCO workshop of a small group of molecular biologists and biochemists at the All India Institute of Medical Sciences. At our request, a special meeting was convened to discuss the implications of recent developments in the field of genetics for the policy of malaria eradication being followed in India and other Third World countries. Some of the leading authorities on malaria eradication from a national level agency were called to discuss the issue. That was a time when disturbing reports regarding the reappearance of malaria were being received. The heady dream of seeing an India free of malaria was already being doubted. There was sufficient scientific basis to face the unpalatable fact of mosquitos resistant to DDT appearing on the scene. The biologists referred to the genetic mechanism of the appearance of drug resistance. It was explained that mutations leading to drug resistance appear randomly at very low frequencies, maybe one in a million. The drug may wipe out all the sensitive organisms except the mutant. The mutant would then reproduce making the drug ineffective. It was also explained how the simultaneous use of two or three drugs would reduce the possibility of the appearance of drug-resistant mutants by a million times or more. The practical point of this theoretical understanding would be to add one or two more insecticides to the DDT spray, and thus save the country from the appearance of resistant mosquitos. The malaria experts were amused, to say the least.

The seniormost among them politely pointed out that their concern was with practical programmes of eradication and not with biological theories which, though founded on scientific lines, were of value

only within the confines of laboratories. He further explained that the National Malaria Eradication Programme had been sanctioned and blessed by funds and technical guidance from WHO, the DDT spray programme was running at full steam and no changes could be undertaken on the basis of theoretical concepts. When pressed by the biologists, the experts reiterated that even if a few resistant mosquitos had appeared, it would not matter since the programme was nationwide. "A few resistant mosquitos must not cloud our view," they stressed. The biologists lost the argument, but as all of you know, resistant mosquitoes have won the day!

Why is it that the senior most scientists working for malaria eradication ignored scientific arguments and biological facts? It is difficult to believe that they were not familiar with the genetic arguments advanced by the biologists. Why is it, then, that the malaria experts, and also such an august body as WHO, pressed on with DDT spray when scientific theory belied the very basis of the programme? What is the fundamental reason behind this irrationality? It is unbelievable that even now DDT spray is being piously applied by malaria workers all over the Indian countryside, when the entire body of scientists, not to speak of the public, know that mosquitos are fast turning resistant. Equally unbelievable is the fact that respectable international aid programmes continue to support and encourage this totally unscientific waste of the nation's resources, and continue to buttress the attrition of manpower. And probably even more disturbing is the knowledge that leading technocrats and opinion-builders of the nation have turned a blind eye to this contradiction in the management of one of the crucial health problems.

We are not talking of isolated instances. We are referring to a national pattern. Let us take a third example.

The textbooks recommended by a leading national agency carry a chapter on population to generate awareness amongst children regarding this critical national problem. We have analysed the population chapters threadbare. These chapters talk of the accelerating rate of population growth which negates the fruits of increasing production and thus creates poverty. The chapters argue that India's poverty problems could be resolved merely by controlling population and by increasing production.

This thesis being presented in these textbooks does not explain why India's godowns are full of grains, while multitudes, who in fact produce the grain, remain undernourished and even die of hunger. These textbooks do not refer to the problem of distribution of resources, disparity in society, and extremely low purchasing power of the people living below the poverty line.

A couple of years ago, at a training course for 400 science teachers of Hoshangabad District, we asked the teachers to conduct a survey of malnutrition in Hoshangabad and surrounding villages. The objective was to train these teachers in scientific methods of data collection and analysis on the basis of a problem existing in their own environment. When given this project, the teachers laughed, for they had read in their school textbooks that Hoshangabad District was surplus in wheat. How, then, could there be any malnutrition, and that too in and around the district headquarters of Hoshangabad? Maybe you would find cases of malnutrition in some remote tribal villages, one of the teachers pointed out. However, we persuaded the teachers to go ahead with the survey. Within hours reports started pouring in regarding children suffering from severe malnutrition right in the middle of the town. By evening, the teachers had data to prove that malnutrition was characteristic of Harijan and tribal section of the villages.

We had then the scientific basis for raising the next question: “How is it that these children are suffering from malnutrition, while each village of the region is exporting wheat?” And then, suddenly, the brighter teachers asked, “Why is that textbooks teach that poverty is chiefly a result of population growth negating the fruits of production?” Should our textbooks not explain to children the percolation or lack of percolation of the benefits of increased production to the people living below the poverty line? How is it that our textbooks have managed to ignore the basic malaise of our society, namely, that the fruits of increased production do not reach the poor, despite being available in so called abundance? Does it not make you wonder that a single scientific survey enabled the Hoshangabad teachers to see through the population-production myth being promoted in our textbooks, while the irrationality behind this myth has escaped the attention of a leading national agency given the task of educating India’s children?

I would like to take up one more example to substantiate the point I am making. Three years ago, I was introduced to a British Council expert in the office of one of the heads of departments of the National Council of Educational Research and Training (NCERT).

The British Council expert explained that he was in India to advise NCERT on audio visual aids, especially on the production of slide-cum-tape modules. I enquired whether he was aware of the conditions in Indian schools which lacked funds for buying even chalk and *taat-pattis*, or of the fact that most of the schools were beyond the reach of electricity and worked in single rooms often loaned to them by the grace of a local feudal landlord. The British expert showed awareness of all this. I naturally, then, wanted to know the logical basis on which the British Council wanted to take up such an irrelevant activity in the Indian school system. The expert had no answer.

Yet during these last three years, the British Council programme has grown and spread. Hundreds of science education workers and experts have been trained and have become busy in producing fancy slide-cum-shape modules all over the country in teaching training institutes and science education centres. At a meeting of teacher-educators in Jabalpur last month, a number of such modules were exhibited with great pride, for these represented the entry of the teacher-training institutes into an advanced technology framework, having been given a large amount of modern equipment such as expensive cameras, projectors, and tape-recorders under a foreign-aided programme. When anyone tried to find out what use would be made of these prize exhibits, there was always an uncomfortable silence.

Another shocking effect of this kind of activity also emerged at the Jabalpur meeting. The language of the module was so highly Sanskritised that it was totally incomprehensible to the primary school children for whom the module was prepared. Even the advice on better nutrition showed no awareness on the conditions of poverty from which these children came, since the module advised the children to eat plenty of fruits, vegetables, milk products and meat!

When the attention of the experts was drawn to these age gaps, a village teacher quipped, “Why do you worry at all? This material will never reach the primary school anyway.” This simple truth so well understood by the village teacher was apparently beyond the comprehension of the national experts and international aid agencies who are behind this programme. The irrationality of this activity is further emphasised by our knowledge that the audio-visual teams presently engaged in producing these expensive modules have neither shown any interest in the past nor ability for producing simple wall charts for classrooms! Suppose a question was raised in the Lok Sabha regarding this national wastage of energy and diversion of valuable resources, how would NCERT

explain the implementation of a programme which ignored the socio-economic conditions of Indian schools?

From what I have said so far, an impression might be emerging that unscientific traditions and irrational thinking characterise only the highly educated elite and thus constrain only the national level agencies. The irrational processes in fact seem to pervade the rest of society as well. Ten years ago, I attended an All-India Conference of Sarvodaya Workers at Nasik in the august presence of Jayaprakash Narayan. The conference had decided to start concentrated programmes for strengthening the *Gramdan* movement. Each State was asked to select three districts for special effort so that the energies of all the cadres could be concentrated to show successful results. After this general session, each State unit met separately.

At the Uttar Pradesh meeting, the State-level secretary asked the workers to propose the names of three such districts. No one dared to speak. The secretary then suggested that Ballia District should be the first to be selected 'because JP was born in this district'. He went on to propose that Agra could be the second district since the president of the State unit hailed from there. And the third district should be, of course, the one to which he belonged. The readiness with which almost 300 Sarvodaya workers raised their hands affirming the proposal was amazing. No one questioned the criteria of selection. An entire year's programme had been planned without any reference to the socio-economic conditions in a particular region, or to the ability of manpower, or to the potential response of the people. Why is it that the mere birth of Jayaprakash Narayan becomes a valid basis for selecting a district., and that this makes sense to hundreds of trained cadres? Does it not show a critical gap in the training of these workers or possibly in the entire of Sarvodaya?

Let us now try to understand the basis of this widespread irrational and unscientific behaviour in our society. It is only with this understanding that we can hope to build a programme to resolve the crisis. I recall the first training course we organised in 1972 for 40 village science teachers of Hoshangabad District. On the very first day we asked the teachers to measure the length of a table lying before them. A metre stick in hand, each together went up to the table and carefully measured its length and recorded the reading on a slip of paper. At the end of the exercise, the readings were transferred from the paper slips to the blackboard. Suddenly there was a lot of whispering among the teachers. Several of them stood up and protested. The readings showed tremendous variation—these varied from 98 cm to 108 cm. A second attempt was made. This time the variation was reduced. The readings now varied from 100 cm to 106 cm. On the third attempt, the range of variation was from 101 cm to 105 cm. However, the fact was that the variation remained. It could be reduced by practice and improved skill, but could never be made zero.

There was a great deal of hue and cry among the teachers. How could it happen? Science was concerned with eternal truth, one teacher philosophised. "How could the truth be variable?" another demanded. Obviously, neither the table nor the metre stick was changing in length, most of the teachers insisted. Year after year we have repeated this exercise with fresh batches of teachers until it has become an accepted feature for about six hundred teachers engaged in science education in the district's two hundred odd middle schools. That variation was intrinsic to all scientific observation is a concept which has been culturally and philosophically one of the most unpalatable for our science teachers.

The question is, therefore, whether such variation in observation is a phenomenon confined to natural sciences alone, or whatever such variations characterise social sciences as well. We now have

evidence of two kinds of variations in observation in social sciences. The first one concerns sampling errors. As an example, an interesting story needs to be told. Two years ago we organised a youth camp to study the impact of severe drought affecting Madhya Pradesh. Some of the youth had surveyed the effect of drought on employment conditions. The data collected by them were being examined.

One of them was from the village Kamti remarked that there was hardly any unemployment problem in his village, for his data showed that labour was not available for digging wells. He gave precise figures of the wells awaiting completion. Immediately, another young fellow from the same village expressed his disagreement. He produced data on the large-scale migration of the landless and marginal farmers from the same village to find employment on railway lines and on PWD roads. A detailed analysis followed. It was revealed that both the young men had presented correct data. Then what was the truth about unemployment? The difference in the two positions turned out to be the results of the different socio-economic background of the two persons—one of them hailed from a rich farmer background, while the other was a small farmer living in the poorer part of the village. The first one found it difficult to get labour because his people either underpaid or did not pay at all, and also because they could not ensure long-term employment. The second one, being closer to the reality of poverty, had first-hand experience of a different kind. The particular social background of the first observer constrained his view, since it emerged from observations of partial reality of the richer few.

Thus in social sciences, observational differences are often a result of the way samples are collected, which in turn is a consequence of the socio-economic differences in the background of the observers. It is our contention that such errors can be corrected by scientific training as we were able to do during the youth camp two years ago.

There is a second choice of observational differences, however, which seems to be beyond the realm of scientific training. Let us consider an example. I was a member of a small team sent by the Department of Science and Technology of the Government of India in 1978 to Orissa to do developmental planning for a cluster of five villages in Puri district. During our stopover in Bhubaneswar, the Government experts briefed us on the results of their survey of the same cluster of villages. We were told that the primary need of the area was for developmental programmes, especially a large-scale cattle development effort involving artificial insemination centres, fodder cultivation, veterinary services and cattle feed supply networks.

However, during our own survey, we were struck by the drought conditions and the extreme poverty of the region. How such a drought-stricken area could support a cattle development programme, we failed to understand. We stopped by a number of landless peasants working on the fields of others, and asked them, “Suppose the Government is willing to undertake programmes according to your needs, what would you like the Government to do for you?” One of them pointed out to the barren hillock nearby and suggested that the hillock be afforested. Another suggested that the contract of the local minor forest produce, such as *mahua*, should be subdivided into small contracts and be given to the poor people on bank loans, so that the rich contractors from the north did not take away their wealth. The third suggested that the large tracts of unused Government land, as well as land belonging to the rich people, be redistributed among the landless. Not one of them even mentioned a cattle development programme.

What then was the basis of the briefing given to us at Bhubaneswar? When pressed, the Government experts told us flatly that we had been talking to the wrong people. They took us to the homes of a couple of rich farmers who gave us good refreshments and of course asked us to recommend cattle development programmes to the Government in New Delhi.

Here was an example of observational differences in social sciences whose basis must be understood. When viewed from the perspective of rich farmers and the vested interests of Government experts, large-scale and well-funded development programmes appear to be the need of a region. However, when viewed from the perspective of massive poverty, redistribution of resources and changes in management practices of the existing resources appeared to be the need. There is a wealth of evidence to show that such differences are related to the vested interests dominating the social structure. Scientific training can be of little help in such cases.

It is our experience that, whenever confronted with economic interests and questions of socio-political power, scientific processes often reach their limits. We have gone deep into this subject, and have been amazed by the widespread influence this type of observational differences on the very directions and priorities of rural development. We first became aware of this malaise of development programmes through one of our own experiences. We had organised a small cattle development programme, including a cross-breeding service, in Bankhedi in 1972. We had been advised by some of the leading authorities concerned with milk co-operatives and cattle-bearing that milch cattle was the most suitable cottage industry in generating massive rural employment. Successful examples of Amul in Kheda district of Gujarat and of Bharatiya Agro-Industries Foundation at Uruli Kanchan in Pune district of Maharashtra had often been quoted to us.

After three years of this work, we looked at our data to see who were the people who had benefitted from the cross-breeding service. We found that most of the beneficiaries were well-to-do farmers and successful lawyers or *baniyas* from a nearby town. A small number belonged to the middle farmer class. No one had come forward for cross-breed cattle from among the marginal farmer and landless classes. "How would such a programme help the rural poor?" we wondered. We were upset by these data and decided to check with another local voluntary agency also involved with cattle-breeding. Their experiences matched with ours, although this agency worked in an irrigated region and had easy access to the markets of the towns.

However, we were continuously reading newspaper reports and hearing seminars in which a reputed voluntary organisation was claiming that the benefits of cattle-breeding are distributed amongst all classes of rural population. We then decided to look at the registers kept at the insemination centres of this voluntary agency. There was a big gap between the public claim by this agency and the data in its registers. Here, too, the poor sections of the population were excluded from the benefits of cattle breeding. Why, then, did this voluntary organisation as well as several important Government agencies continue to present cattle development as a means of solving rural poverty? Nowhere do we read analysis showing the differential impact of cattle development on rural people. Why is it that our observations do not match with the observations of several leading agencies of the nation while the reality in all such experiences is the same?

It appears as if there is a conscious effort to suppress and mutilate certain kinds of observations in social sciences. There is a growing evidence to this effect. Last year, All India Radio, Bhopal, interviewed us. During the interview, we narrated our experience of cattle development. The first part of the statement referred to the number of beneficiaries, to our attempts to popularise fodder and to

spread knowledge of animal husbandry. In the second part of our statement, we pointed out how the programme had failed to make any impact on rural poverty. The taped interview was taken away by AIR and we were dumbfounded when it was broadcast a week later. The first part of our statement presenting a glamorous view of our work was broadcast, but the second half was methodically excluded. Suppression of scientific observation was clearly in evidence.

This experience of ours should help in understanding the experience I have narrated from Orissa. It is not a question of lack of scientific method in our thinking. It is clearly a question of confrontation with vested interests which prevent scientific processes.

Besides the matter of scientific observation which I have discussed, the second dimension of the method of science is concerned with analytical thinking, or the logical process. Let us examine its role in social sciences. Once again, I would like to share one of our experiences with you. Along with our cattle development programme in 1972, we introduced a new technology of digging irrigation wells in our area. These wells, called ring wells, are made up of prefabricated concrete rings which are sunk in the ground and are able to tap the aquifer in the same way as tube wells. Inexpensive, technologically within the means of a rural community and constructed within two weeks, ring wells are a textbook example of appropriate technology. Ring wells have spread in more than 100 villages and about 500 such wells are already irrigating approximately 5000 acres of land, generating new employment and changing one-crop zones to two or three-crop zones.

Despite these optimistic observations, our group subject the data to further analysis. This revealed in 1977 that the well had then increased the annual agricultural production of the area by Rs. 12.5 lakhs. Out of this additional annual income, Rs. 9.5 lakhs had gone to the 300 farmers who then owned the ring wells. The remaining Rs. 3 lakhs were distributed among a couple of thousand of farm labourers. Obviously much more had gone to the landed few and much less to the large number of landless in the area. We concluded that the production of ring wells, though benefitting the region in an absolute sense, was at the same time increasing the gap between the rich and the poor.

The realisation of this limitation of agricultural development as a means of solving rural poverty forced us to explore alternatives. We examined the case of cottage industries as an instrument for generating rural employment. A number of exploratory projects such as carpentry and manufacture of electric chokes were undertaken. In addition, markets were surveyed to assess the potential of selling a variety of cottage-industry products, ranging from soaps to *agarbattis*. The size of local markets for indigenous shoes and ready-made clothes was also assessed. The results of this exercise were compiled and analysed. We discovered that a total of about 20 cottage industries could generate jobs for only about 100 poor families Bankhed block consisting of 125 villages and more than 1 lakh people. Obviously a drop in the ocean. We also found out that most of the transactions in the village markets involved the well-to-do and the middle class. The poor, despite their vast majority, had only a small share.

Analysis also revealed that the limited potential of cottage industries in rural areas had little to do with lack of knowledge of modern technology, or the low 'trainability', or with meagre managerial skills, but it had more to do with the limited capabilities of markets. The low purchasing power of the vast majority of the people living below the poverty line and the domination of village markets by competitive goods from urban middle-size and monopolist industries defined the boundary conditions of the rural marketing system. Despite this glaring reality, the Government agencies and several voluntary groups continue to glamourise the role of cottage industries in rural development.



Why has this reality been systematically ignored by so many groups and agencies over the last several decades? Why is it that this simple analysis of this limitation of cottage industries has not been presented from public platforms by the Government's departments of Industries and a large number of voluntary groups? Is it that the educated elite and the national leaders are incapable of the needed logical exercise, or is it that the socio-economic crisis and the insoluble problems of rural poverty make it too dangerous to scientifically accept this reality?

What concerns us at the moment is not the limitations of cattle development, or of irrigation programmes, or of cottage industries as instruments for solving India's poverty, but the fact that an analytical view of rural development problems is not being shared with the people of this country. Our brief experience has revealed to us that rural society is critically divided into two sections—a small minority of the rich and middle-level farmers which siphons off the benefits of development programmes and has vested interest in their community, and vast majority of the landless, marginal farmers, and artisans which is excluded from this process and is generally not influenced by what goes on in the Planning Commission and the agencies or Departments concerned with Industry, Development, Science and Technology.

Whenever somebody preaches rural development, we always want to understand whose development is being talked about. Is one referring to development of the moneylender, or of the rich farmers, or of the marginal peasants, or of landless labour? When such analysis is negated, it leads to the typical confusion which is reflected in such questionable phrases as the rural-urban gap, or planning from below, or community development, or *Panchayati Raj*, or people's participation. Such phrases presume the existence of a homogeneous community or imply that the poor do not exist in cities and the rich do not live in villages. It is our contention that as long as scientific analysis of India's development experience is avoided or suppressed, the basic premise of the entire planning process will remain untenable.

Regarding scientific analysis, there is often loose talk about this process being the exclusive preserve of the educated elite. Our experience with non-formal education has given us sufficient evidence to challenge this grave misunderstanding. I am reminded of a brief interaction with a representative of the Khadi Gramodhyog Commission who once met me accidentally in a bank office. He was looking extremely unhappy. On enquiry, he said his main job was to popularise the electrically-operated potter's wheel, nicknamed 'Power Chak'. He was disturbed because, despite his hard work, no potter was willing to accept the power chak, although he was offering subsidies, low interest credits and all other necessary support. I asked if he could explain his failure to popularise what he called appropriate technology. He said the people of this District were uneducated and did not understand modern technology and therefore rejected the power chak. He had reached a conclusion which was typical of what is widely accepted by the educated elite. I decided to help him unravel the situation.

One being questioned, he readily accepted that the potters he had met in villages had difficulty in selling what they produced on their chak, and therefore were often without business. I asked him to explain how the power chak, meant for increased production, would help a potter who is already unable to sell his products. What was the potter's problem—the market or his ability to produce? The Khadi Commission's representative gradually began to see the logic and accepted that the Commission's example of appropriate technology was, after all, not so appropriate. The uneducated potters on their own had conducted a logical analysis, of the conditions which constrained them from

earning more, and therefore had a scientific basis for correctly assessing the role of power chak in their lives, something which the experts in the Khadi Commission had failed to do.

Let us consider a recent example. A group of about one hundred landless and marginal farmers from an adjacent village approached us last month to explore a new path for solving their problems of poverty—they needed land, rights to a certain minor forest produce, and demanded a fair share in the distribution of Government-controlled sugar. They had decided to organise themselves and challenge the control of the feudal forces on their lives. We pointed out to them the risks involved in this path and drew their attention to how their attempts to improve their conditions could be quashed by the joint action of loyal landlords and the revenue authorities and the police. This was, of course, already well known to them. We demanded to know from them what they felt was their bargaining point. One of their leaders, who could not even sign his name, gently pointed out: “It is *we* who produce goods and *they* consume only what we produce for them. If we stop working, they shall starve. This is our bargaining point.” We have accumulated a series of such experiences which show that the poor people who suffer oppression and exploitation have remarkable abilities for participating in a growing analytical process and have often amazingly correct analysis of the obstacles in the path of their own development.

From all this, we would like to postulate five significant hypotheses. These are being postulated in the hope that these will accelerate experimentation and further testing to evaluate their validity or lack of it. At this stage, these may be regarded, at best, as tentative and partial.

- (i) Correct observation and scientific analysis are essential tools for comprehending the socio-political reality around us.
- (ii) There are more ways than one of observing the reality in social sciences. What aspect of the reality one perceives is critically related to one’s cultural and economic background. In contrast, the process of observing and analysing reality in the natural science is dependent only on the scientific skills of the worker, and not on his or her class background.
- (iii) The ability to make correct observation and to conduct analysis in the natural sciences can be developed through training. However, in the field of social sciences, the attempts to improve observation skills and analytical abilities often do not succeed when there is a clash of vested interests. Thus, there are inherent factors in the social sciences which limit the application of the scientific method.
- (iv) The potential for the scientific processes is not confined to the elite and the educated sections of our society. Such potential exists amongst the oppressed and the uneducated people and can be further enriched through training and experience.
- (v) The process of socially relevant planning is one in which the planners work with the oppressed people to develop a scientific basis for observation and analysis. Without establishing such a process, the dichotomy between today’s development and social change programmes, on the one hand, and the lives of the oppressed people, on the other hand, will never be bridged.

These hypotheses help us to define the role of science in building a people’s movement. As we understand it today, the primary role of science is in enabling the people to comprehend the socio-political reality of their environment through the scientific method so that their struggles for justice and development can be planned on the basis of reliable data and logical thinking. The process of education is thus defined as the process of spreading the method of science among the people to enable them to understand the obstacles which prevent their development and to successfully plan their struggles for justice.

If the role of science in people's movement and the educational process as understood by us today is acceptable, we may then contend that it would be essential to spread the scientific method for the purpose of training cadres and creating people's organisations. How is this theoretical understanding of the role of science and of the educational process to be implemented in field situations? What have been the experiences in doing such work? What are the obstacles in developing this educational process with people? In order to explore answers to this question, we must first break down scientific method into its essential elements: desire to know or inquisitiveness, observation, data collection, analysis and inference are some of the elements on the basis of which an educational programme may be conceived.

Let us take a concrete example. Early this year, we organised a youth camp around the problem of tuberculosis in villages. The young participants were asked to survey the incidence of tuberculosis, its relationship with the working and living conditions of the people, the role of the National TB Control Programme and limitations imposed by social structures on the treatment of the disease. For several days, the participants toured villages in teams, collected data, listened to agonising stories of whole families being wiped out by the disease, and of the role being played by Government doctors, private practitioners and feudal forces. The entire data was compiled teamwise and then the teams were asked to make a list of all the problems they had perceived during the survey. From these teamwise lists a common list was then prepared, on the basis of which a detailed discussion followed on the causes of TB, of its high incidence amongst the poor people, and of the inability of the Primary Health Centres to play an effective role in the treatment. The discussion on the reasons behind the non-percolation of the benefits of the National TB Control Programme and what it reveals about the structure of village society.

On the basis of analytical understanding, the youth camp concluded that there was no use in starting a parallel medical service while a full-fledged national programme existed. It was much more important to make people aware of the facilities available under the national programme and to enable them to demand their share in this. This example of educational process shows us how a group of young people planned the next phase of activity by applying the scientific method to their experiences.

During our experience of spreading scientific amongst the oppressed people, we have identified five major obstacles, namely, (i) information gap, (ii) tendency to follow traditions, (iii) fatalism, (iv) fear of reprisals by the vested interests, and (v) inability for abstraction. Let us take these one by one.

It is a general experience that lack of information among the oppressed people is often a great limitation in understanding their own reality. When this gap is filled, ability to comprehend reality builds up quickly. This is exemplified beautifully by the work of the Kerala Shastra Sahitya Parishad (KSSP) in Calicut District. KSSP took up the problem of pollution caused by a well-known rayon factory in the village of Walcad near Calicut. This factory, located on the banks of the river Chaliar, has totally polluted the river as well as the air. The people of Walcad village have suffered heavily in health, in their farming and in many other ways. Yet for years, they accepted this state of affairs with only grumbling and not much more. KSSP encouraged the students of Calicut Medical College to organise a health survey. The survey revealed a high incidence of a particular lung disease caused by the presence of sulphur dioxide and carbon monoxide. KSSP then sent a team of biologists, chemists, geologists, and engineers. The team prepared a massive report and took colour slides of the polluted river and finally prepared a technical plan for controlling pollution. On the basis of all this, KSSP conducted intensive evening classes for several weeks to share this rich information with the poor people of Walcad village. When we visited this village last year, we were amazed to see how

technical terms as sulphur dioxide, carbon monoxide, percentages and solubility had become part of the common idiom. The evening classes soon led to the demand by organised villagers that the factory implement KSSP's technical plan for controlling pollution. The long-drawn struggle eventually cornered the powerful industrial group which had no logical way of escaping from this demand without using its credibility in Kerala. The technical plan is now being implemented and the people of Walcad have at least won their first battle.

The second obstacle of the educational process is the deep-seated tendency to follow tradition. I am reminded of a play prepared by two young villages of Rohana village near Hoshangabad. These boys belonged to an area which has been affected in a major way by the famous Tawa irrigation dam. The Tawa programme has led to many unanticipated problems, such as creation of water-logged areas, loss of fertile soil and lack of drainage. In addition, the Government passed an Act according to which every farmer in the Tawa command area has to accept land-levelling operations conducted by the Government agencies. The expense of this operation is charged to the farmer. Of course, bank credit is extended to cover the charges normally amounting to Rs. 2000 upwards to Rs. 4000 per acre. The farmers feel tremendous hardship because of being forced to accept this indebtedness.

The play prepared by the boys referred to this problem. In the first few acts, they presented the collusion of the revenue officials with the local landlord in persuading the villagers to accept a plan of reconsolidation of land holdings before going in for levelling operations. In the process, the landlord corners most of the fertile land earlier belonging to the poor farmers and the revenue official takes his bribe. Later on the play focusses on the indebtedness caused by the land-levelling operations and has a scene in which the Tehsildar is helped by the police to force the villagers to pay their first instalment when their crops had failed due to fertile soil being disturbed by land-levelling. So fact the act shows a close relationship with the reality which exists in the villages of this region. In the last act, the play shows the villagers pleading with the District Collector for relief. The Collector is extremely helpful, is disturbed by the inhuman acts of his Tehsildar and of the corrupt revenue officials. He promises immediate relief and orders suspension of the erring officials. We asked the boys whether the last act matches with the real experience. After hesitating, they accepted the fact that the Collector never acts the way he is shown in their play. Why then did you show this untrue picture of the Collector? One of them explained that all stories and films end well and therefore they must end their play also on a happy note. The second pointed out that it would look very bad if the seniormost official of the District is not shown favourably. They had been taught to show respect towards authorities. Having shown some challenge towards the lower officials, they eventually decided to fall in line when the Collector's turn came, lest their elders reject the play.

The third obstacle is the deep-rooted fatalism in our society which often restricts the growth of scientific process. I am reminded of a *Basod* (a Harijan bamboo worker) who learns his livelihood by making bamboo products. I once saw him without work at a time when he should have had a big supply of bamboo from the local forest depot. When quizzed, he explained that all the bamboo had been sent to the distant paper mills at Nepa Nagar. This uneducated Basod obviously was well-informed. I prodded him, "How come one paper mill takes all the bamboo away, while thousands of poor Basods like you are deprived?" He was emphatic, "Nepa mills are more powerful than all the Basods put together." I asked him if there was any way in which the Basods could balance the power of the Nepa mills and demand their share of bamboo. He said it would be possible only if they got organised and approached the forest depot collectively. I asked him, "Why don't you do this?" He said, "No. it is not possible. We will never get together. It will take no less than God to bring us together on a common platform. Therefore, this year bamboo is not in our fate." Having given a series

of logical and well-informed statements, the Basod finally reached the end of his scientific process. The limit was clearly defined by god and fate together.

The fourth obstacle is the fear of reprisals by the vested interests. The impact of this fear cannot be fully appreciated unless one is involved in the daily lives of the oppressed people. Two years ago, we proposed a programme to a group of Rajhar Adivasis of a nearby village through which they would be able to gain rights to grow lac on Kausam trees which happen to be their particular profession through generations. So far, they had acted as daily wage labourers and grew lac on behalf of big landlords or contractors. Their long-cherished goal was gaining rights to grow lac on their own. Yet, when confronted with an opportunity to gain these rights, no one came forward. We learnt later that our evening meeting with the Rajhars was followed by severe threats of being beaten up or lynched by the local landlord, who also happens to be the Sarpanch, in case they insisted on going ahead with the programme of growing lac. Most of these Rajhars are either indebted to one of the feudal families in the village or work on their farms as labourers. The feudal families were concerned with their economic and political control would be weakened if the Rajhars gained economic independence. For two years, we waited for the Rajhars to respond. No amount of scientific analysis of the causes of their poverty and of the manner in which owning of the lac business would alleviate the same would help bring out a response.

And then, suddenly, an unplanned and a totally unrelated incident changed the entire picture. In May this year, Government-controlled sugar was distributed in the village, as usual, unfairly, the poor people being deprived of their fair share by the Sarpanch or the landlord. For the first time in local history, a group of villagers gathered courage and approached the landlord to seek justice. Incensed by the collective courage shown by the villagers, the landlord got a couple of Adivasis beaten up. There is nothing unusual about such incidents which have been traditionally accepted passively. This time, however, we intervened. The Sarpanch was forced to call a public meeting at which he tendered unconditional apologies. Those of you who have personally experienced feudal India would probably appreciate the impact which this meeting must have made on the minds of the poor people. What two years of continuous discussion with Rajhars and all the application of analytical thinking could not bring about, was achieved suddenly by the emotional impact of the sugar incident. For once there was a real experience to show the people that feudal power was after all not invincible. The limits of scientific method were thus broken. The Rajhars came forward last month to join hands with other oppressed people of the village to become organised, to break out of a century-old feudal framework, and to gain their rights to grow lac on the Kausam trees. The scientific processes can once again be initiated and taken to new heights.

The fifth and the last obstacle is the problem of abstract thinking. Let me again refer to the work of KSSP in Walkad village. Towards the end of our visit, we informed the Walkad people that there was an identical problem of river pollution in Shahdol District of Madhya Pradesh where a paper mill owned by the same industrial group had polluted the Sone river downstream. The Walkad people showed no interest. Shahdol and the Sone river were too far away, too remote to have any meaning for them. We then asked them if they perceived any relationship between the local rayon factory and the Government in Trivandrum. Again, there was a disturbing silence. Trivandrum did not have much meaning in their local struggle for justice, nor could they see any possible relationship between the factory and the Government far away. Here is a problem of inability for abstract thinking which is going to constrain the building of a people's movement more severely than has been probably anticipated or consciously understood so far. Yet there is evidence that the potential for abstract thinking does exist amongst the oppressed people. An example needs to be cited.

In Thane district of Maharashtra, an Adivasi movement called Bhoomi Sena has taken lead in seeking justice for oppressed people. Representatives of about 100 village-level Tarun Mandals once gathered to plan for the next strike, against the rich farmers, for better wages. An educator raised an interesting question. He wanted to know how the Tarun Mandals looked upon other sections of the society, namely, small farmers, middle, peasants, landless labourers, and so on. Each representative, one by one, gave his perception of who was a friend of the movement, and who was not. Stories were narrated of incidents, bringing out the character of various groups. All of these statements were recorded, analysed, and an amazing inference was drawn. The conference concluded that the middle-level farmer is not a friend of the movement, since he employs others to do farming just as the rich farmers do. However, the small and marginal farmers who work on their own farms as well as seek employment along with the landless in the lean season must be considered friends, since they are also exploited just as the landless are.

Someone pointed out that the poor farmer is, in fact, exploited twice—once when he seeks *Khaoti* (a form of loan) in the lean season from the money-lender along with the landless, and the second time when he seeks loan in the form of seeds to do the sowing. The conference, therefore, reached new understanding; in the next strike, small farmers would be persuaded to join hands. Here is an example of the possibility of abstraction from simple experiences, of building up general principles from daily life. This process of generalisation and creating principles from practice would be a critical dimension of spreading the scientific method.

If we can learn how to overcome these five obstacles to the educational process which I have listed, we can then see a powerful and growing process of education emerging. If the methods of science can thus be made part of people's thinking, there is hope that the domination of the educated elite and of the vested interests in the field of planning and development can be challenged by the common people. If the oppressed people begin to subject the policies of the nation to scientific analysis, there is hope that a constraint can be placed on the irrationality revealed in the S&T education meeting held under the auspices of the Planning Commission, on the unscientific planning of critical health programmes such as malaria eradication, on the myth being promoted in our school textbooks about population growth being the prime cause of India's poverty and on the introduction of irrelevant activities, such as the slide-cum-tape modules, in our school system, and so on. There would then be hope that the personality cult and sycophancy reflected in the Sarvodaya conference and similar feudal tendencies prevalent in national life would no longer be quietly accepted. Scientific criteria would necessarily be demanded from the leadership for its statements, acts and decisions. If the critical dimension of abstraction could be added to the analytical processes of the people, the people of Walkad village would be able to relate their oppression with the oppression of the people of Shahdol, and its linkages between industrial group owning the rayon factory in Walkad, on the one hand, and the Governments in Trivandrum and New Delhi, on the other hand, would become clear to the people of the country. People's organisations built up through scientific processes, hopefully, will not limit their struggles to demands for merely better wages or land, but would instead struggle for ways of creating and sustaining a society relatively free of disparities, exploitation, stagnating hierarchies, and other mechanisms of socio-political backwardness. This would then mark a creation of a People's Movement with a difference.

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